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Technical Report

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MECHANIZATION STUDY OF THE ELECTRONIC PROPERTIES INFORMATION CENTER, HUGHES AIRCRAFT COMPANY, CULVER CITY, CALIFORNIA

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ABSTRACT

The Electronic Properties Information Center (EPIC) at Hughes Aircraft Company utilizes mechanized processes for storage and retrieval of information. Outputs of the mechanized system, which is designed for the Honeywell 200 computer, are a printed file of materials with related properties, an accessions list, and a search printout of retrieved bibliographic citations with abstracts. A new system being developed for EPIC's mechanized activities is being designed for the General Electric 635 computer; this is part of a generalized information retrieval system being developed for several related activities at Hughes. EPIC is very satisfied with the results of its mechanization programs.

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I. SUMMARY

The Electronic Properties Information Center (EPIC) utilizes mechanized processes for storage and retrieval of information through special files based upon detailed indexing.

As of January 1965, EPIC's information base consisted of more than 22,000 documents. Its contract calls for the addition of 5,000 documents per year. In practice, the additions generally exceed this number by 5 to 10 percent. Most of these are located in the journal literature, symposia and conference papers, Government documents containing unclassified and unique information are also included. Vendor literature is included when the only information available is in manufacturers' catalogs relative to electronic/electrical properties of materials. EPIC tries to include only experimental data; selected theoretical papers are included in the system only as an aid in interpreting the data. No attempt is made to be comprehensive.

EPIC was established in June 1961 at Hughes Aircraft Company in Culver City, California. It is operated under contract to the Air Force Materials Laboratory, Research and Technology Division, Wright-Patterson Air Force Base, Ohio. As a designated Information

Analysis Center of the Department of Defense, EPIC is authorized to provide information services to the entire DoD community and those parts of the scientific community which have been "certified" as eligible by the Defense Documentation Center. In 1965, the Center answered 906 questions.

An analysis of 104 requests from Feb. 1965 through Jan. 1966 shows that 92 percent of these asked for technical data, 7 percent asked about EPIC system capability, and the other 1 percent were either misdirected or incomplete. Requests varied from specific data of a single property on one material to complex bibliographies.

In addition to answering a minimum of 400 technical inquiries per year EPIC prepares, by the terms of its 1965 Air Force contract, 1,000 pages of data sheets and three special state-of-the-art reports per year.

II. MECHANIZATION

1. CHRONOLOGY

In July 1961, Hughes Aircraft was awarded a contract by the Air Force Materials Central, Aeronautical Systems Division, to do the following: (1) to establish systems procedures and facilities for searching, acquiring, abstracting, and indexing the literature; storing, retrieving, compiling, and evaluating the data; and publishing and disseminating bibliographies, property tables, data sheets, and summary reviews; and (2) to perform the above tasks for two categories of materials: semiconductors and insulators. Hughes' proposal specified coordinate indexing, utilizing two punched card files--a bibliographic file sorted by accession number and a subject (material-property) index file sorted by descriptors.

In January 1962, Phase I of the Hughes contract was essentially complete. Concentration on semiconductors began Phase II, and tentative layout of worksheets, etc., was considered. A coding system was developed for a mechanized printout of descriptor cards for semiconducting material names and insulation material names. IBM 1401 programs for posting descriptor cards were developed.

By mid-April 1962, some 4,600 pieces of literature had been acquired and accepted for abstracting and indexing. A change in the coordinate index format for both categories of material, semiconductors and insulators, provided for one line for the material name and a second line for the property name. Work continued on revising a glossary of terms.

By June 1962, a large number of titles and abstracts had been searched, with 6,000 pieces of literature acquired. Abstracting had been performed on 4,000 of these, indexing on 3,500. Detailed analysis of the project resulted in an operations flow chart.

By mid-September 1962, 5,500 accession numbers had been assigned, resulting from searches of some 40,000 titles, abstracts, or indexed entries. New abstracting and indexing forms were being prepared.

By October 1963, some 16,000 additional titles and abstracts had been searched, with 3,000 acquired, 2,200 of which were abstracted and indexed. Specialized worksheets had been prepared for each of the nine categories of materials, and a change or addition notice form had been developed. During this period, the Center decided that data collected in the semiconductor and insulator categories were now sufficient to handle requests and began filling such requests. During 1963, 100 requests were serviced.

By the end of 1963, 11,650 articles had been collected and indexed, and 1,200 pages of data had been published. Code numbers were reassigned to all materials in the system. There were 2,600 names of materials in use by the end of the contract year; there had been 1,108 in use at the beginning of the year. The number of properties increased from 41 to 56. A Flexowriter was obtained, and punched paper tape was introduced to store bibliographic information and abstracts. The material-property descriptor and bibliographic card files were converted to magnetic tape in preparation for introduction of the IBM 1401 computer system. During 1964, some 265 questions were answered and by the end of the year holdings numbered 17,050 papers.

In the summer of 1965, the system was transferred from the IBM 1401 to the Honeywell 200 Computer. By the end of the 1965 contract year holdings numbered 22,350 papers, some 1,130 pages of Data Sheets were prepared (for a cumulative total of 3,519 pages), and 81 computer-compiled bibliographies were prepared totalling 11,050 pages. In addition, 443 pages of Special Reports, and numerous interim reports were prepared.

2. DESCRIPTION OF PROCESSES

(1) Input Procedures

1. The technical staff of EPIC regularly scans 40 to 50 journals and about 12 abstracting publications for articles

pertinent to the collection. Articles to be added to the holdings are checked off in the journals.

2. A clerk then cuts out the articles from EPIC's journals or makes Xerox copies from journals in the Library of Hughes Aircraft Company.

3. The article next goes to a member of the technical staff who analyzes and indexes it. He either prepares an original abstract or uses or adapts the author's abstract. (For Entry-Abstract Form, see Appendix A-1.)

4. Each item is assigned an accession number, which is recorded on the item and on an Entry-Abstract Form.

5. The abstract sheet goes to the Flexowriter operator, who transcribes the bibliographic information and the abstract onto punched paper tape. At the same time that the tape is prepared, three cards for this item are made. These are filed manually, one under the name of the first author, one by accession number, and the other under the journal title. The cards are filed daily and are used for checking for duplicates. (The information on the punched tape is later transferred to magnetic tape.)

6. For a given material, the appropriate properties information are then checked off on a 4" x 12" worksheet,

one worksheet for each material in the article. (See Appendix A-2.) The various materials and properties combinations discussed in a given article are subsequently coded by number. The combination of material and property code numbers are related to the accession number of the article.

7. This worksheet goes to the data processing group, where appropriate punched cards are prepared. [The cards are sent for computer processing in batches approximately every two weeks and are then converted to magnetic tape for updating the files.] Two files are presently used: the first is the accession file, which lists materials and properties together with appropriate accession numbers; and the second is the bibliographic file--linear file of bibliographic information ordered by accession number.

(2) Search Procedures

The usual search request is for properties data on a specific material(s). This type of request is formulated by material and property codes and is punched on EAM cards in the format shown in Appendix D-2.

The EAM card is then read into the computer, where a search is made of the materials-properties file for accession numbers

corresponding to the desired materials and properties. The accession numbers obtained are then run with the bibliographic file.

(3) Outputs

1. Examples of printouts are the alphabetical list of materials and corresponding material code numbers and the material-property coordinate index. These are shown in Appendix B.

2. Output from the search process is a printout of the retrieved bibliographic citations with abstracts.

3. ACTIVITIES BEING PLANNED OR DEVELOPED FOR MECHANIZATION

Hughes Aircarft Company is acquiring a GE-635 computer. This computer will be used in developing a generalized system of information storage and retrieval for use by the entire Hughes complex. This generalized approach has the advantage of economizing on program development in that all users will utilize the same basic routines and file structure. It also offers file flexibility in that files of one organization may be used by another. EPIC will have one file in the new system, containing both descriptor and bibliographic-abstract entries.

Use of the system will probably require the batching of requests to include several requests at a time. The batched retrieval information will later be separated on the basis of a search number which will accompany each request through the system.

The weighting of terms may be introduced later in the program development, but this feature is not considered of particular importance to EPIC.

Present planning is primarily on conversion of the existing program to the new machine. This will open up avenues through which advanced work may be done, such as introducing additional dimensions to the material and property terms. These might include sample specifications, experimental and sample parameters, etc., so that given a required set of parameters, ranges, and property variables, a required material may be identified.

III. PROGRAM SYSTEM DATA

The EPIC program systems perform the basic operations of master file updating and retrieval. Three systems have been designed for these operations; they are discussed in this section. One, no longer used, is the original system developed for EAM punched card equipment operation with an IBM 1401 printout. This original, or first system, was developed prior to the EPIC operations for use in the Hughes Technical Document Center. It was adopted, in toto, for use in EPIC until the conversion to tape files. The second system uses tape files in place of EAM cards. This was later converted for the Honeywell 200. The third system is expected to be part of a generalized information retrieval system being developed for several related activities at Hughes. This last system is in the planning stage and is being designed for the GE 635.

1. MAIN CARD FILE -- EAM/IBM 1401 SYSTEM

The main card file was a file of EAM cards of the formats shown in Appendix C. There were two types of cards in this file: master cards and detail cards. The master card contained the alphabetic descriptor in columns 1-68, material code in columns 69-73,

and property code in columns 74-75. If no property were to be indicated, zeros were substituted in 74-75. Descriptors might be combined as shown in Appendix C-1. There, the "Category," Insulation Materials was coded 0300500, Insulation Materials - Acetal Plastics was 0302500, and Insulation Materials - Arc Resistance was 0300503. In the same manner, Insulation Materials - Acetal Plastics - Arc Resistance would be 0302503. The deck was coded and sorted alphabetically with code gaps for future expansion. Master cards were specifically identified with a punch in column 80. The detail card indicated the accession number code of the indexed source. In columns 69-75, the material and property codes were repeated, tying the detail cards to a master card, and the accession number punched in columns 76-80. The horizontal line number of the output format to be printed was carried in columns 66-68. The terminal digit of the accession number identified the column position of the output format. These detail cards were filed in the main file behind the corresponding master cards.

2. PROGRAMS -- EAM/IBM 1401 SYSTEM

Figures 1, 2, and 3 are flow diagrams for this system. Only the updating flows are shown, since the retrieval routine was simply a sort on material and property codes followed by a card printout (5 x 8 descriptor cards).

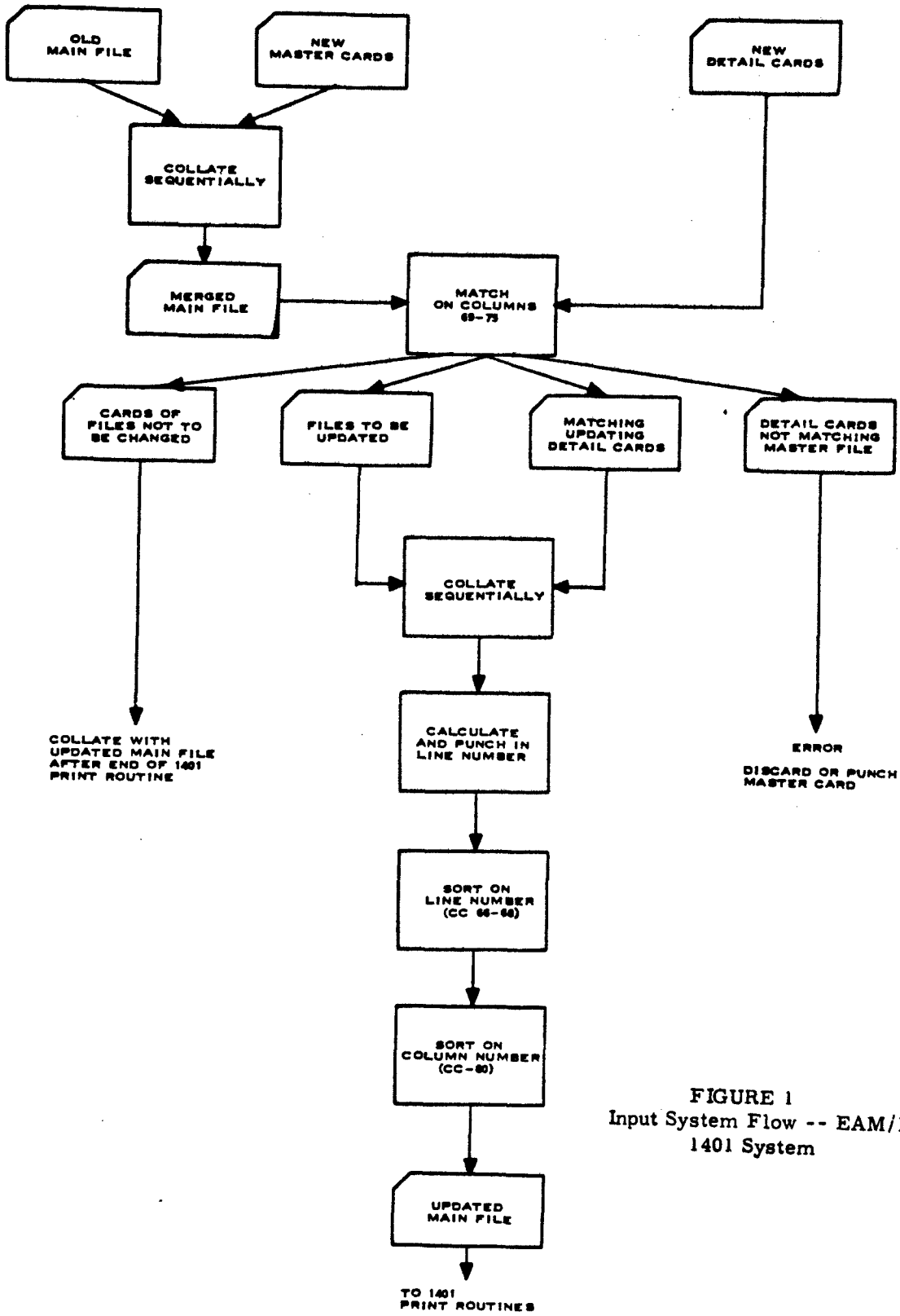


FIGURE 1
Input System Flow -- EAM/IBM 1401 System

FIGURE 2

Routine for Posting Descriptor Cards -- EAM/IBM 1401 System

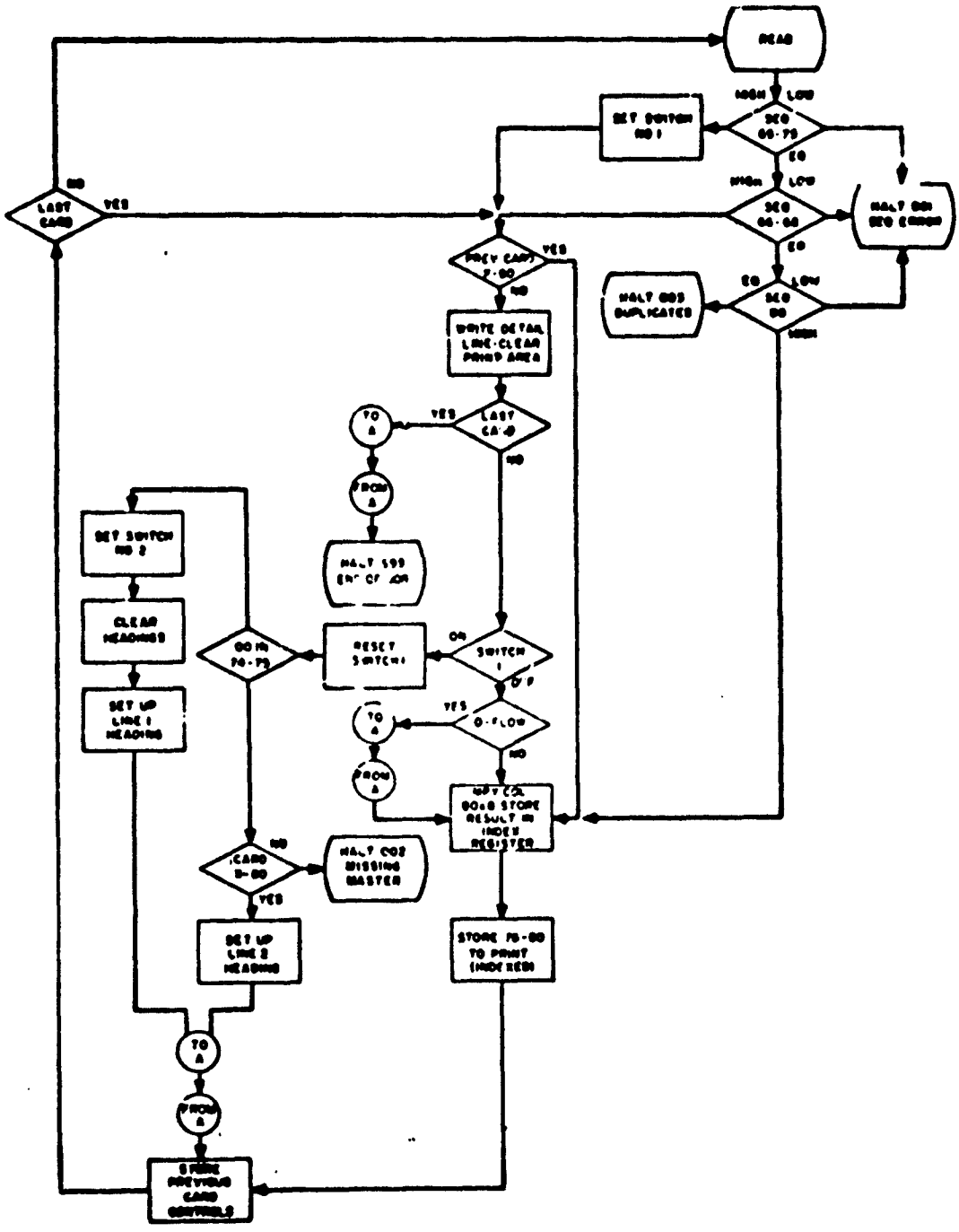
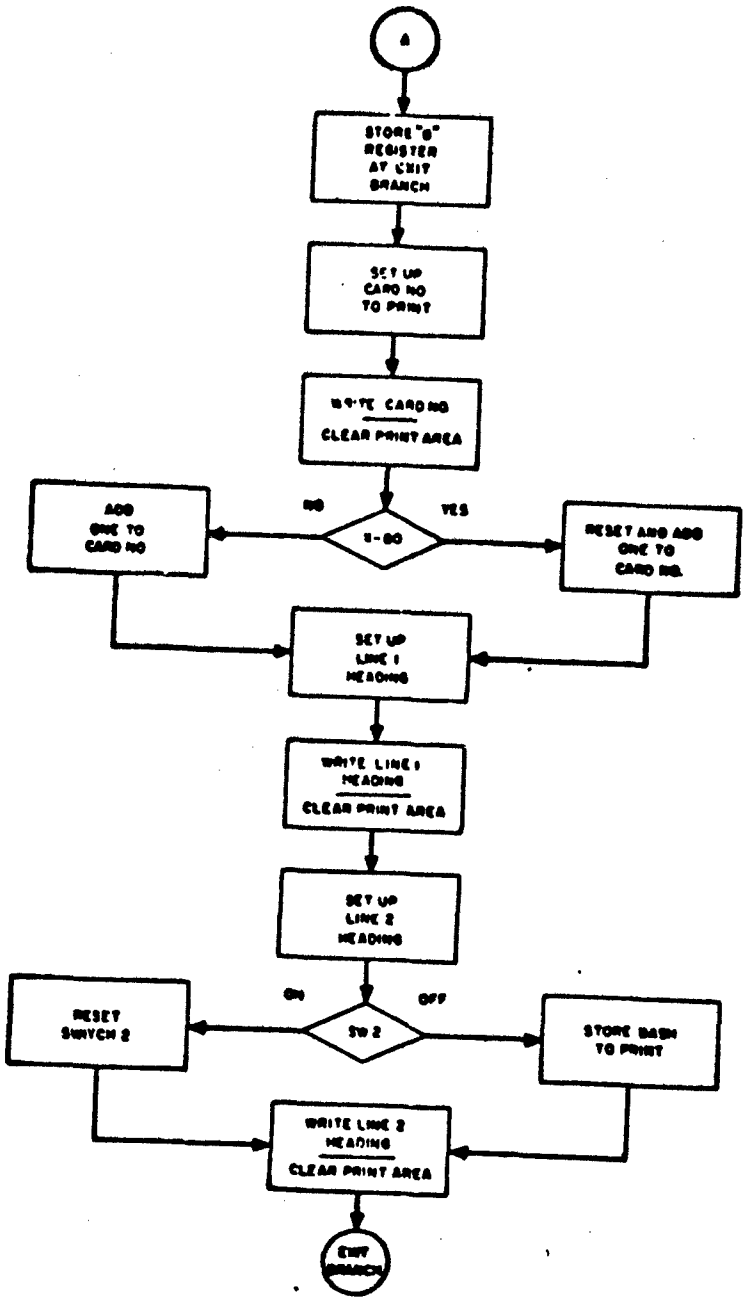


FIGURE 3
Subroutine for Posting Descriptor Cards -
EAM/IBM 1401 System



As shown in Figure 1, sorted new master cards were collated in sequence with the old main file. This deck was then matched with the new detail cards, and the result separated into four groups. The first group was made up of the collated main file cards that did not match the detail cards; this group thus did not require updating. The second group was made up of main file cards that match detail cards; this group was to be updated. The third group was the deck of detail cards that matched the main file. These were to be the updating cards. The fourth group was the remaining detail cards that have no matches with the main file and are therefore error cards to be discarded or held until masters are made. The two resultant update decks were then collated in such a way that the new detail cards appeared sequentially behind the corresponding master card. A new card thus follows detail cards previously entered behind the master and, in the next step, was assigned the next sequential print line number. This resultant deck was now the updated main file and was ready for printout on the IBM 1401 computer.

A detailed flow of the printout system is shown in Figure 2. If a master card is read (sequence 69-75 high), it was printed at the top of the output format (5 x 8 descriptor cards). After the master card, each following detail card was read and stored for one line of accession numbers (sequence 69-75 equal and sequence 80 high). The

next detail card read will have a different horizontal line number (sequence 66-68 high), which will cause the stored accession numbers for the previous line to be printed out. The information on the ne· · card will be stored, thus starting the process again. When a new master card again appears following the detail cards of the previous master (sequence 69-75 high, previous card not punched in column 80), it will cause a printout of the last detail line and then will be printed out itself. The process is repeated until an error occurs (duplicate, out of sequence, missing master), or until the last card is dctected. After the printcut, the output descriptor cards are in alphabetical order and ready to file.

3. FILES -- HONEYWELL 200 SYSTEM

(1) Material Master Card

This file of EAM cards is the counterpart and conversion by Easytran of the master and detail card file used in the EAM/IBM 1401 system discussed in section 2 above. There are two types of cards in the files that are used for updating the main tape file. One type of card has entries for the material name (columns 1-64), transaction code (column 68), material code (columns 69-73), and an identifying punch in column 80.

The second type includes the transaction code (column 68), the material code (columns 69-73), the property code (columns 74 and 75), and the accession number (columns 76-80). The transaction codes are described as follows:

A	Delete complete material code
C	Change single entry (master)
D	Delete single entry
M, P	Change complete material code
N	New entry

Transaction codes M and P are unusual in that they identify transactions of relocating entries from one tape position to another. The M transaction is for properly relocating a material entry that is out of sequence. The P transaction is for combining identical material entries that appear in more than one location. A format for the cards is shown in Appendix D-1. In the program, the card file is converted to tape, and the cards are discarded.

(2) EPIC Material-Property Master Tape

This tape file is made up of the converted material-property master card file. Its format is as follows:

Description	Field
Material Name	1-67 (alphabetical)
Transaction Code	68 (alphabetical)
Material Code	69-73 (numerical)
Property Code	74-75 (numerical)
Accession Number	76-80 (numerical)

There are nine 80-character records in a block.

(3) EPIC Bibliography Master Tape

This tape file is used to print out bibliographic information for each of the retrieved accession numbers produced in the retrieval program. Its format is as follows:

Description	Field
Blank	1
Accession Number	2-6
Blank	7
Code to indicate whether bibliographic or abstract information (A -- bibliographic; B -- abstract)	8
Print Line Number	9-10
Bibliography or Abstract Information	11-125

(4) Retrieval Request Card

Input to the retrieval program is supplied using the card format indicated in Appendix D-2.

4. PROGRAMS -- HONEYWELL 200 SYSTEM

The programs in this system are Material-Property Master Update, Accession Number Retrieval, Bibliography File Update, and Bibliography File Retrieval.

Briefly, requests are keypunched and applied to the Material-Property Master Retrieval Program. The output is a tape of retrieved accession numbers which is applied to the Bibliography File Retrieval Program. The output of this is a list of bibliographies and abstracts relating to the retrieved accession numbers. Descriptions of the programs follow:

(1) Material-Property Master Update

The system flow for this program is illustrated in Figure 4. Update cards are sorted and sequenced in the order shown and then are sort selected on column 68. Two groups of cards result; one group is made up of cards with a M or a P in column 68, the other is of cards with a transaction code other

FIGURE 4

Material-Property Master Update Flow--
Honeywell 200 System

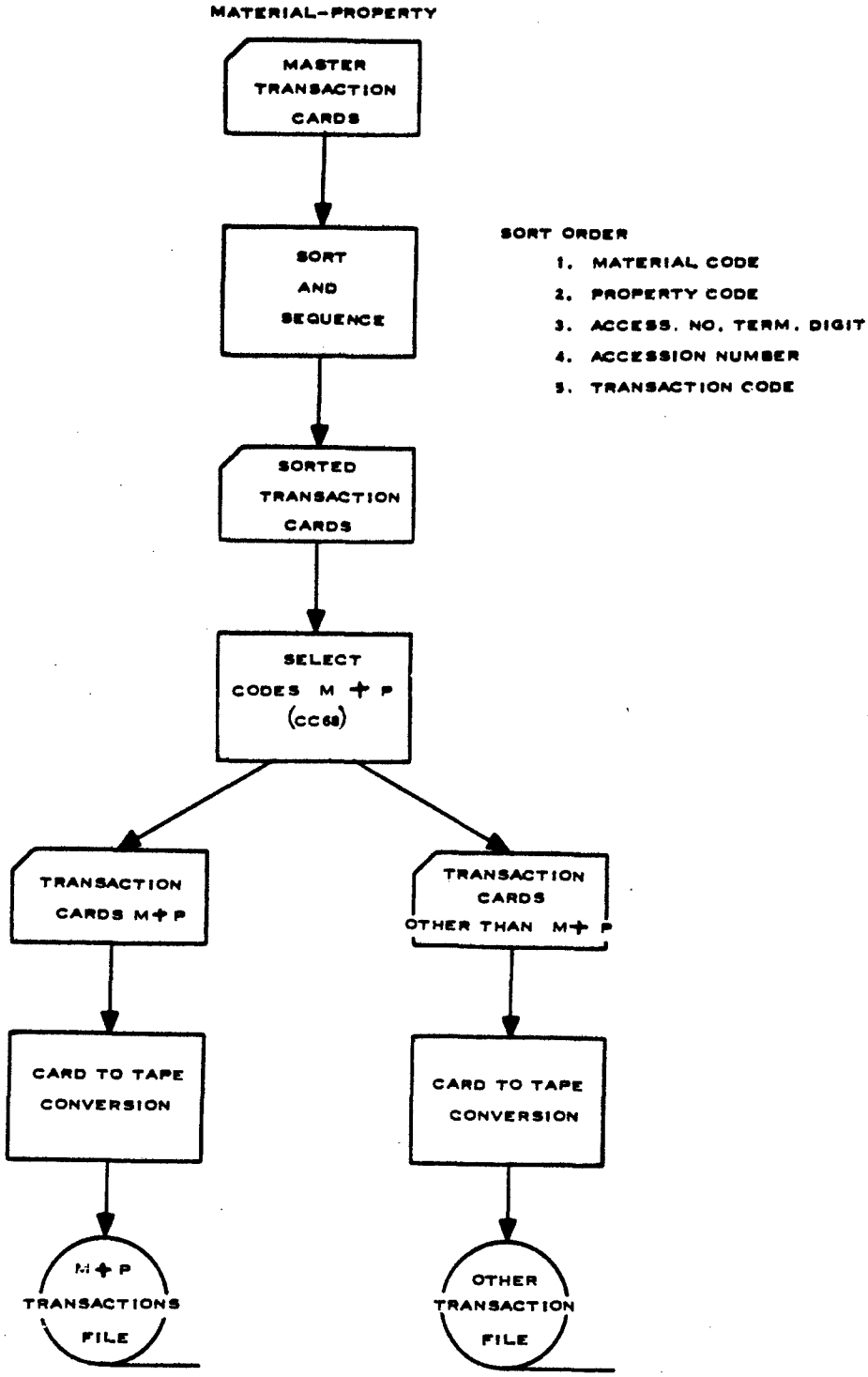
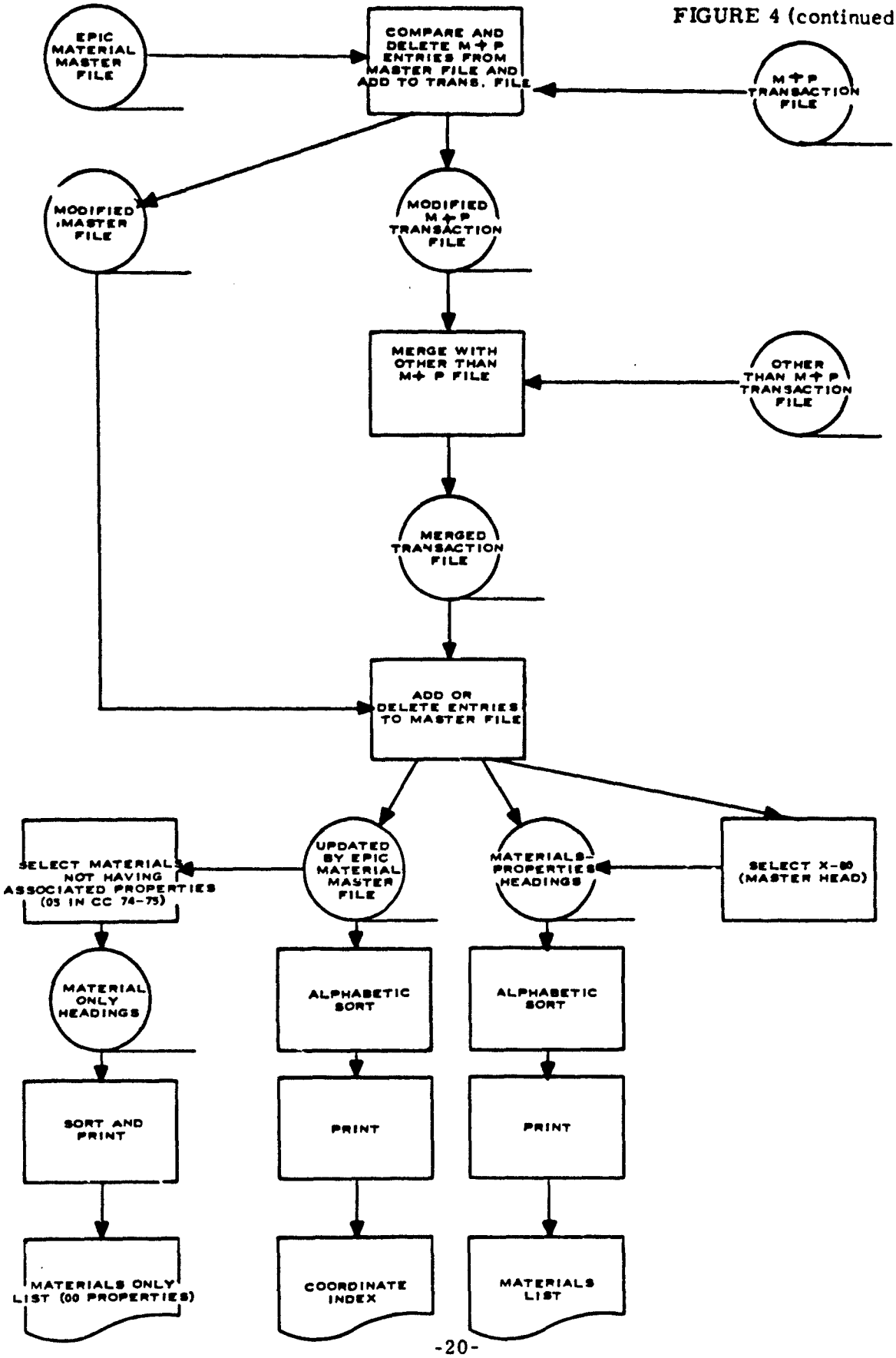


FIGURE 4 (continued)



than M or P. The "M and P" deck is then converted to tape, as is also the "other than" deck. The "M and P" tape is run with EPIC's Material-Property Master tape file where entries corresponding to the "M and P" updating entries are deleted entirely from the master file and added after the entries "M and P" file. The latter is then merged with the "other than" file to produce a single file of update entries. The final step in the update process is to run the update entries with the master file to produce the updated master file. From the file, various printouts may be obtained as desired by EPIC.

(2) Accession Number Retrieval

This run is illustrated in Figure 5. Input to the program is a request for accession numbers relating to a particular material and relevant properties which is keypunched, sorted by porperty within material, and run with the EPIC Material Master File. This produces a tape file of the request specification coupled with retrieved accession numbers which may later be run in the Bibliography File Retrieval Program to add pertinent bibliograpny and abstract information.

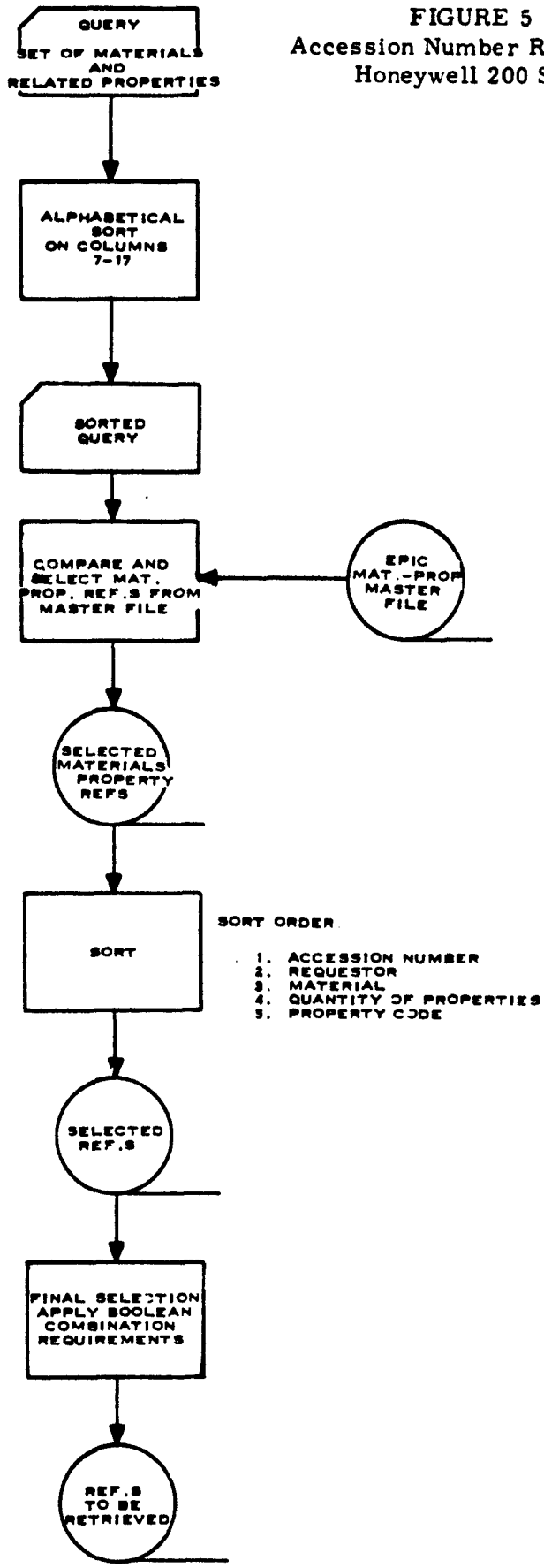


FIGURE 5
Accession Number Retrieval Flow--
Honeywell 200 System

(3) Bibliography File Update

The system diagram for this run is illustrated in Figure 6. Input to the run is a punched paper tape produced by EPIC which conveys new bibliography and abstract information. The paper tape is converted to magnetic tape, sorted by accession and print line number, and then merged with the Bibliography Master File.

(4) Bibliography Retrieval

Figure 7 illustrates the system flow of this run. Input may either be punched cards listing accession numbers for desired bibliographic information or it may be the tape output of the Accession Number Retrieval Program. Either input is run with the master bibliographic file to produce a tape of entries from the latter file selected on the basis of the input accession numbers. These are then sorted and printed out.

5. EPIC MASTER FILE--GE 635 SYSTEM

The EPIC Master File will be the only file in the system. It will contain a descriptor thesaurus (dictionary) section and a bibliography section. The descriptor thesaurus will be a listing of materials, materia codes, properties, and related terms (i.e., other parameter). The bibliography section will contain, for each item, accession number,

FIGURE 6

Bibliography File Update Flow -- Honeywell 200 System

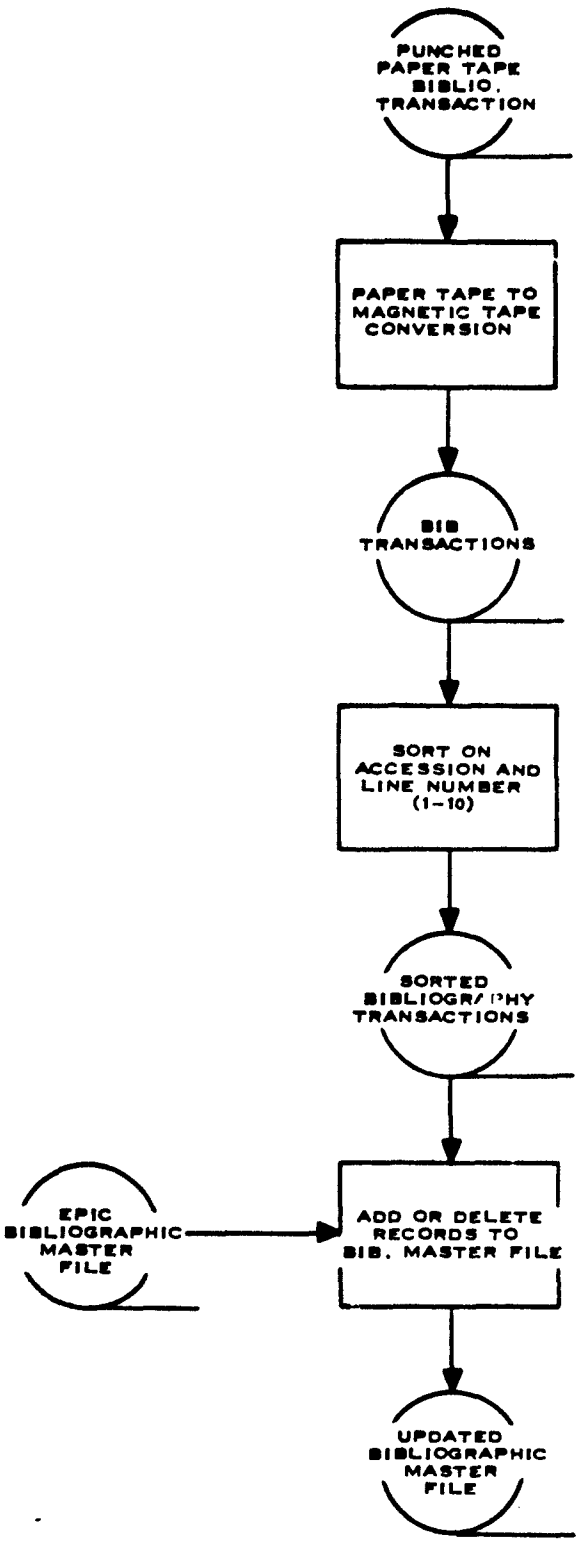
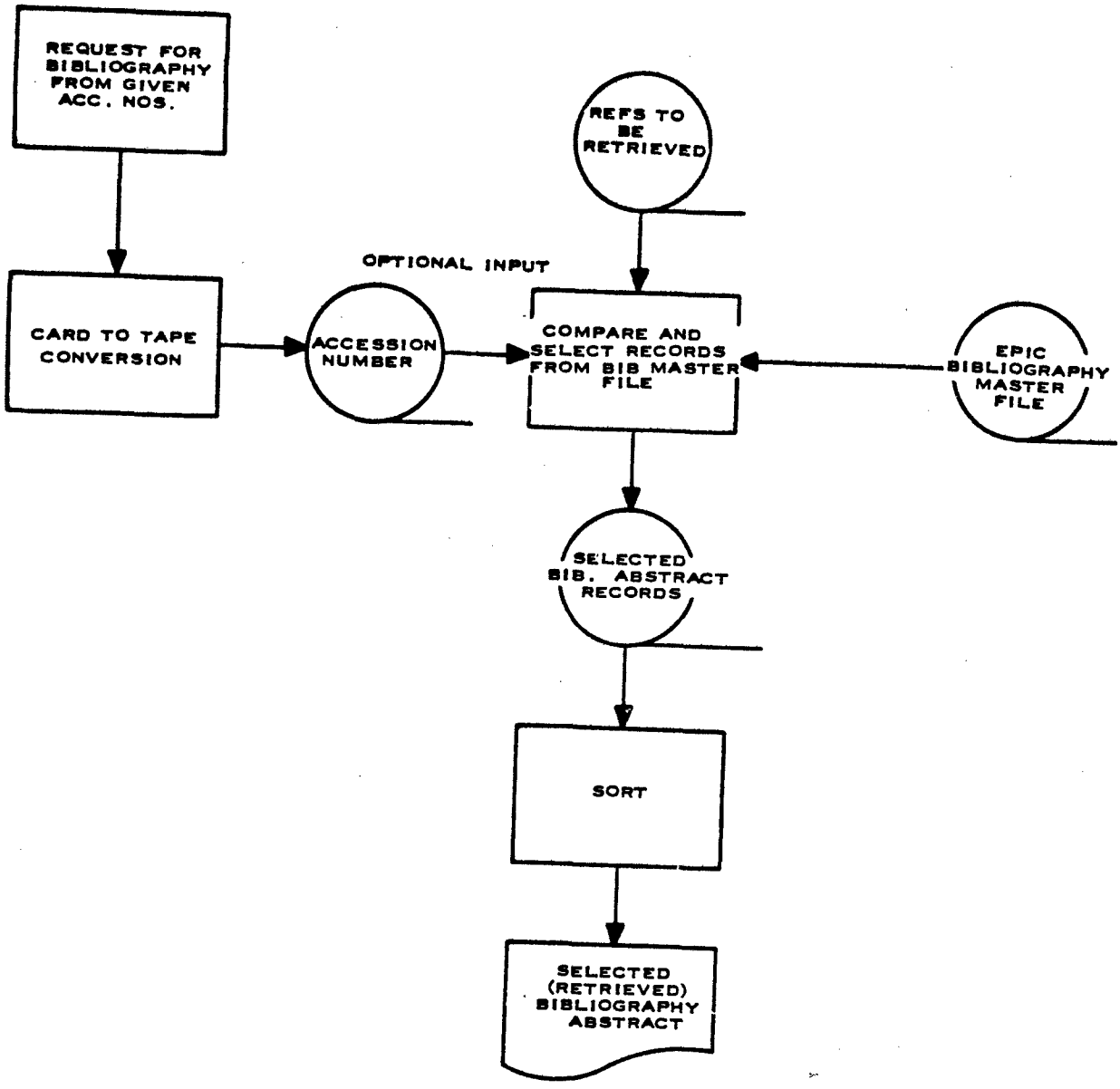


FIGURE 7

Bibliography Retrieval Flow -- Honeywell 200 System



abstract, material code, property code, and bibliographic information (title, author, etc.).

6. PROGRAMS--GE 635 SYSTEM

At the present stage of planning there will be two programs--an update run and a retrieval run. These system flows are illustrated in Figures 8 and 9.

(1) Update

In the update run, new materials and properties (classed as descriptors) will be assigned codes, keypunched, compared to the dictionary section of the master file to verify they are not duplicates, and then added to the dictionary section. New bibliographic information with abstracts and English language descriptors will also be entered on cards, then assigned accession numbers, given the appropriate descriptor codes from the master file dictionary, and finally stored on the master file. The program has provisions for printouts and tape file production, as desired.

(2) Retrieval

In the retrieval run, the dictionary section of the master file is first read into main memory. A group of query cards are

FIGURE 8
Update Flow--GE 635 System

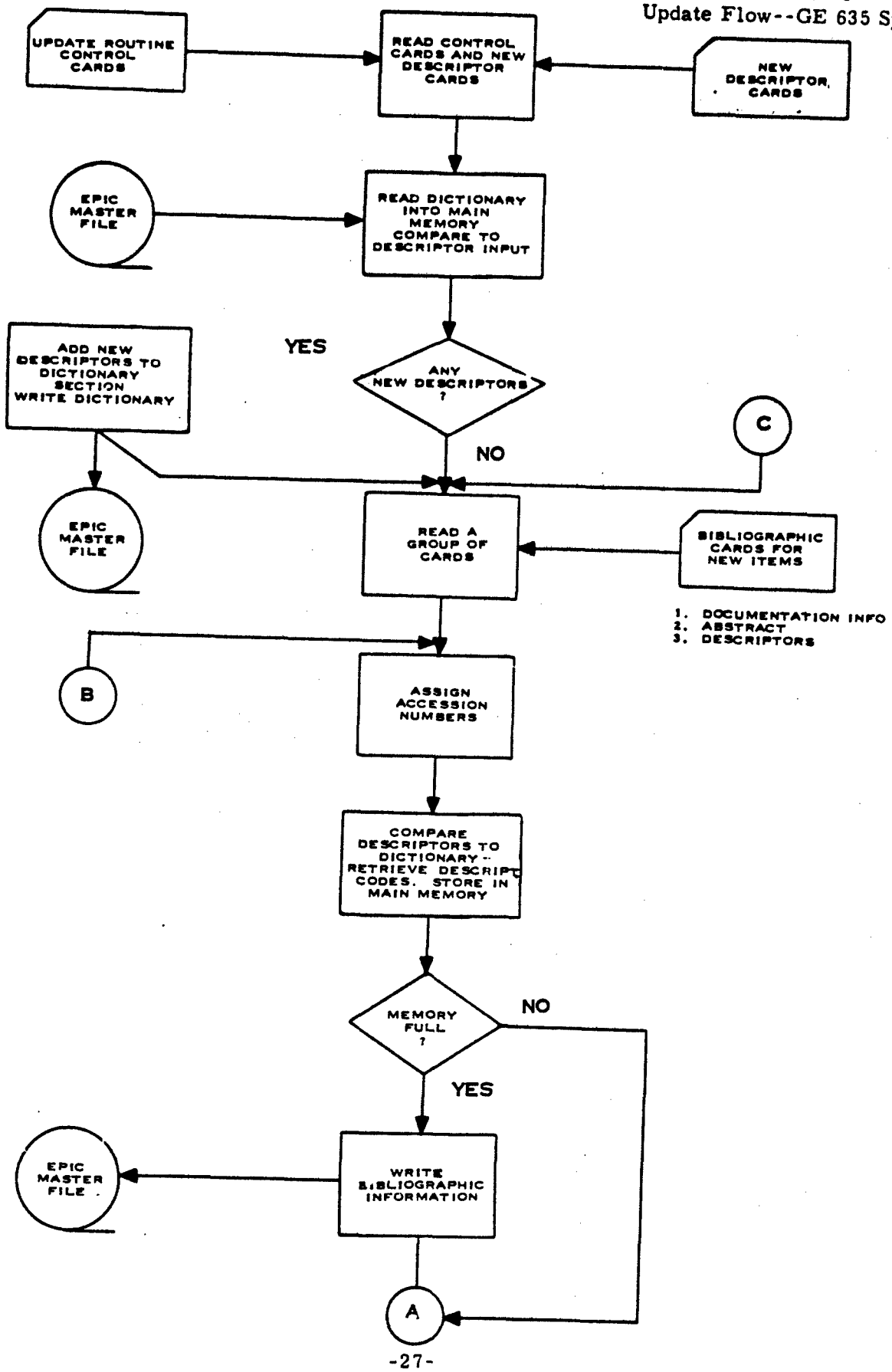


FIGURE 8 (continued)

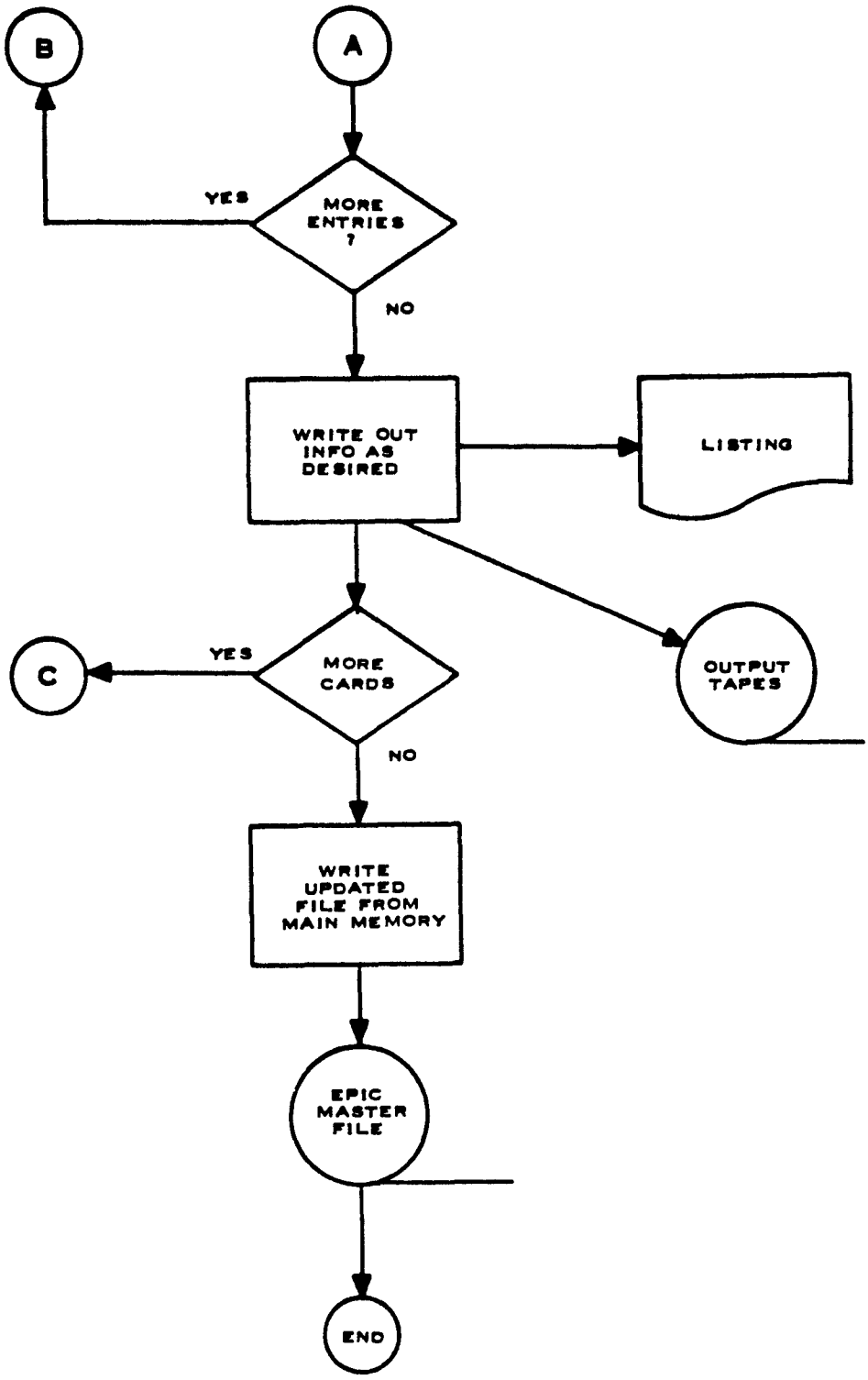


FIGURE 9

Retrieval Flow--GE 635 System

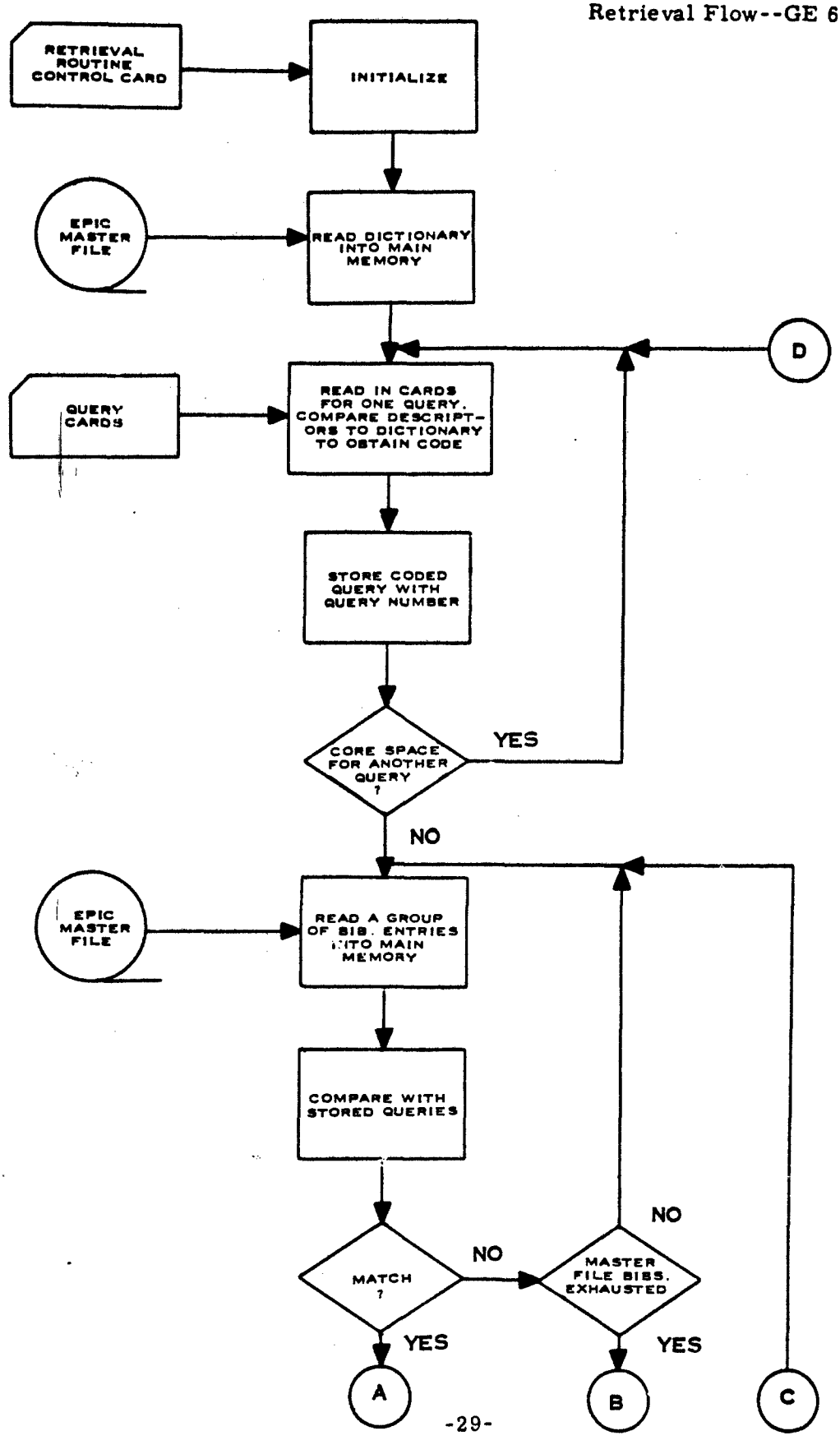
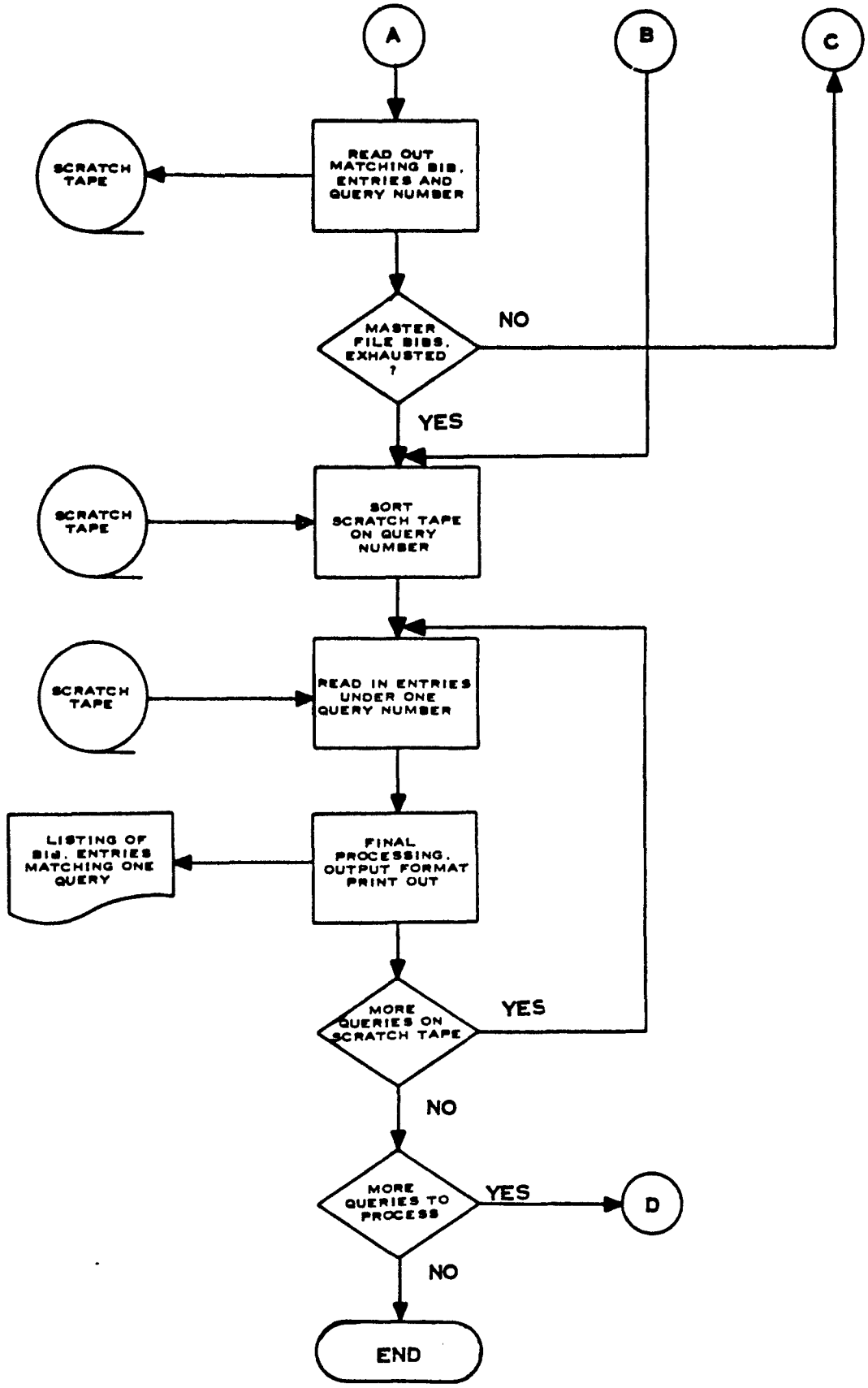


FIGURE 9 (cont.)



are then read in, and the corresponding descriptor codes and related descriptions are derived by comparison with the dictionary. This process is repeated until all of the query card groups are in core or until the core section is full. These may or may not relate to the same retrieval question. Following this operation, the first group of entries on the bibliographic section of the master file are read in and compared to the query descriptors. Matching entries are read out on a scratch file, and the process continues until the master file is exhausted. The scratch tape is then sorted on request number, and the contents are read back into core for final processing and printout. Although not explicit in the program, a system log tape subroutine is planned to record various operating statistics.

IV. EQUIPMENT, COSTS, AND EVALUATION

1. EQUIPMENT

Honeywell 200 Computer

Central Processor with 32,000-character core memory
(6 bits per character, words defined with word marks)

high-speed printer

IBM 1402 card reader/punch

6 tape drives

The original program was designed for the IBM 1401 in Autocoder, converted to Easycoder for the Honeywell 200 by Easytran.

GE 635 Computer

2 Central Processors with 128,000-word core memory
(36 bits per word)

14 tape drives

disc file

A time-sharing interface with 10 teletype terminals is presently planned.

2. COSTS

During 1965, EPIC spent $15,203.40 for data processing. This was spent for time on the IBM 1401 at $60 per hour during the first half of the year, and on the Honeywell 200 at $90 per hour during the latter half of the year. During this year, 81 computer bibliographies were prepared. The average bibliography contained 273 entries, and the average number of pages per bibliography was 139. The total number of entries in these bibliographies was 22,100, and the total number of pages was 11,050, with two entries to a page.

Records of the various development costs were not available. For the planned GE 635 system, approximately 3.5 additional program development man-years will be required. Cost of the GE 635 is expected to be $495 per hour.

3. EVALUATIONS

EPIC is satisfied with the results of its mechanization programs. As a result of this, it is now considering ways of massaging the data to derive new relationships which would not be practicable using a manual method. It is also considering the use of additional constraints such as value ranges, environmental conditions such as temperature and frequency, geometrical features such as thin films, and crystalline structure.

The present system is oriented in its retrieval capability toward materials and then properties within materials. This has the disadvantage of precluding searches on properties in general where specific materials are desired to satisfy known property requirements. It is anticipated that the planned GE 635 system will eliminate this restriction and will provide the capability for Boolean-type searches and the use of value range, environmental, and geometrical constraints. The first operation of the system, however, will be kept simple, performing searches only on each material property descriptor without regard for descriptor relationships or weighting.

Because the master file in the planned GE 635 system contains English language entries such as full abstracts and bibliographic data, it would create a long linear file and require a correspondingly long search time. To avoid this, two files will be used--one of coded descriptor and accession references for searching purposes, and one for the English language correspondents for final printout of the selected items. Whatever the final file structure is, however, it will be designed for the general information retrieval community at Hughes and not specifically for EPIC.

To do otherwise would place a programming burden that might not be justifiable on each of the organizations desiring a mechanized retrieval system.

APPENDIX A

INPUT PROCEDURES

_____ DATE _____ . ENTRY-ABSTRACT FORM

Material Worksheet

Code #	Prop. #	Acc. #
00		
01	GENERAL	
02	ABSORPTION	
03	ARC RESISTANCE	
05	CARRIER DIFFUSION	
07	CORONA EFFECTS	
09	CROSS SECTIONS	
10	CURIE CONSTANT	
11	CURIE TEMPERATURE	
13	DEBYE TEMPERATURE	
16	DIELECTRIC CONSTANT	
18	DIELECTRIC STRENGTH	
20	DISSIPATION FACTOR	
22	DOMAIN STRUCTURE	
24	EFFECTIVE MASS	
26	ELECTRICAL CONDUCTIVITY	
28	ELECTRICAL HYSTERESIS	
30	ELECTRICAL RESISTIVITY	
32	ELECTROACOUSTIC PROPERTIES	
33	ELECTROMECHANICAL PROPERTIES	
34	ELECTRON FIELD EMISSION	
35	ELECTRON PHOTOEMISSION	
36	ELECTRON SECONDARY EMISSION	
37	ELECTRON THERMIONIC EMISSION	
39	ELECTRONIC SPECIFIC HEAT	
40	ENERGY BANDS	
41	ENERGY GAP	
42	ENERGY LEVELS	
44	GYROMAGNETIC PROPERTIES	
46	HALL COEFFICIENT	
50	INSULATION RESISTANCE	
52	IRRADIATION PROPERTIES	
54	LIFETIME	
56	LOSS FACTOR	
60	MAGNETIC HYSTERESIS	
61	MAGNETIC SUSCEPTIBILITY	
63	MAGNETOELECTRIC PROPERTIES	
66	MAGNETOMECHANICAL PROPERTIES	
68	MOBILITY	
70	PENETRATION DEPTH	
71	PHOTOELECTRONIC PROPERTIES	
72	PHOTON ELECTROLUMINESCENCE	
73	PHOTON EMISSIVITY	
74	PHOTON LUMINESCENCE	
75	PHOTON MECH. LUMINESCENCE	
76	PHOTON THERMOLUMINESCENCE	
77	PIEZOELECTRIC PROPERTIES	
78	POWER FACTOR	
80	REFLECTION COEFFICIENT	
81	REFRACTIVE INDEX	
82	RICHARDSON'S CONSTANT	
83	SUPERCOND. TRANS. TEMP.	
88	THERMAL CONDUCTIVITY	
92	THERMOELECTRIC PROPERTIES	
94	THERMOMAGNETIC PROPERTIES	
96	THRESHOLD FIELD	
98	WORK FUNCTION	

APPENDIX B

OUTPUTS

TP1

RCD IS 0085 CHAR

ACENAPHTHENE	0010018000	-	0
ACENAPHTHENE COMPLEXES	0010021700	-	0
ACENAPHTHOL	0010025400	-	0
ACENAPHTHRENE	0010029100	-	0
ACETAL PLASTICS	0010032800	-	0
ACETATE FILM	0010033500	-	0
ACRIDINE	0010036500	-	0
ACRIDINE ORANGE	0010040200	-	0
ACRIDINE YELLOW	0010043900	-	0
ACRIDONE	0010047600	-	0
ACRIFLAVINE	0010047800	-	0
ACRYLIC LAMINATES	0010050000	-	0
ACRYLIC PLASTICS	0010051300	-	0
ACRYLIC-STYRENE COPOLYMER PLASTICS	0010052300	-	0
ACRYLONITRILE	0010055000	-	0
ACRYLONITRILE-BUTADIENE-STYRENE PLASTICS	0010058700	-	0
ACRYLONITRILE FIBER	0010062400	-	0

ACENAPHTHENE

ACENAPHTHENE COMPLEX

ACENAPHTHYLENE

ACENAPHTHYLENE

ACETAL PLASTICS

21121 17602 16923 13455 20296
16951 16714 17505 17539

ARC RESISTANCE

16923 20296
13455
17505

DIELECTRIC CONSTANT

20296
21121 17602 16923 13455 17539
16951 16714 17505

DIELECTRIC STRENGTH

20296 17539
21121 17602 16923 13455
16951 16714 17505

DISSIPATION FACTOR

17539
17602 16714 20296

ELECTRICAL RESISTIVITY

20296
21121
17602 16923 16714 13455 17539
16951 17505

LOSS FACTOR

17602

POWER FACTOR

21121 16923
16951

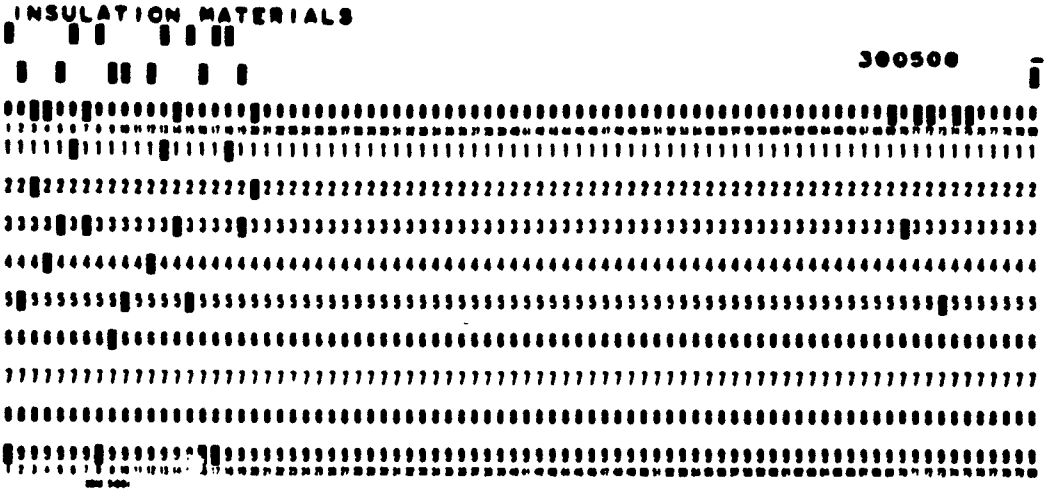
THERMAL CONDUCTIVITY

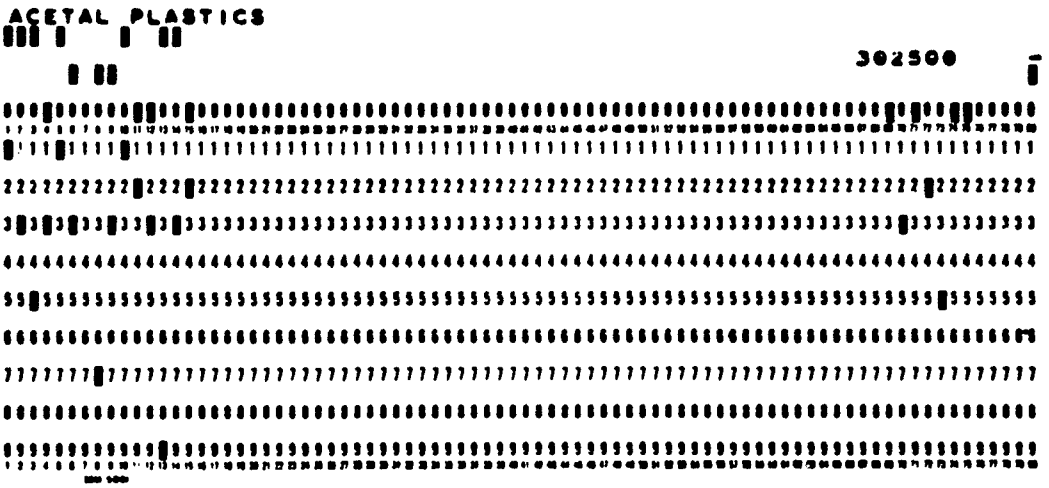
21121

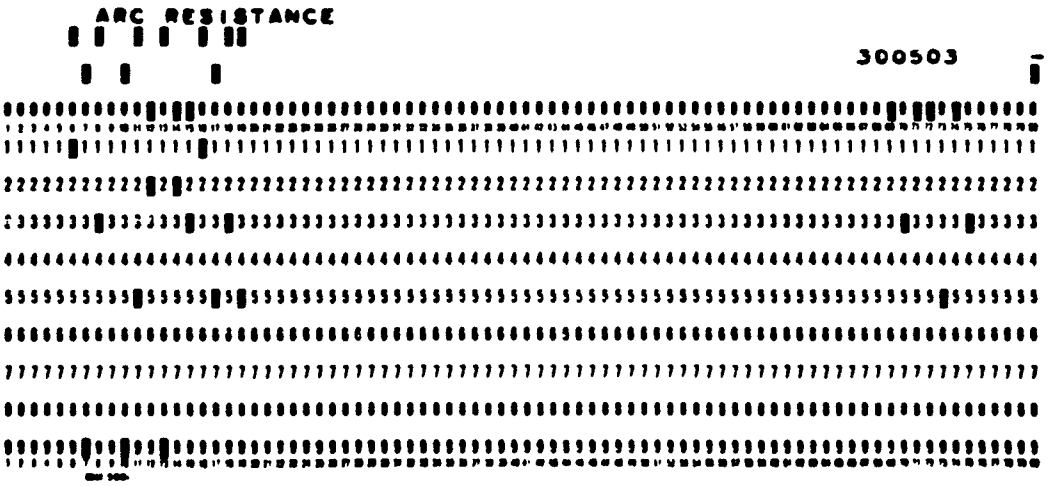
APPENDIX C

MAIN CARD FILE FORMAT--EAM/IBM 1401 SYSTEM

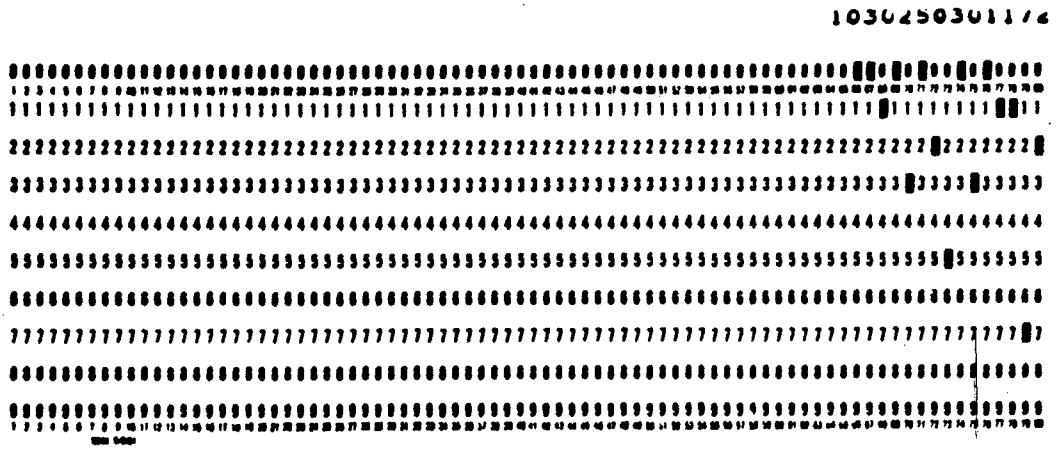
MASTER PUNCHED CARDS

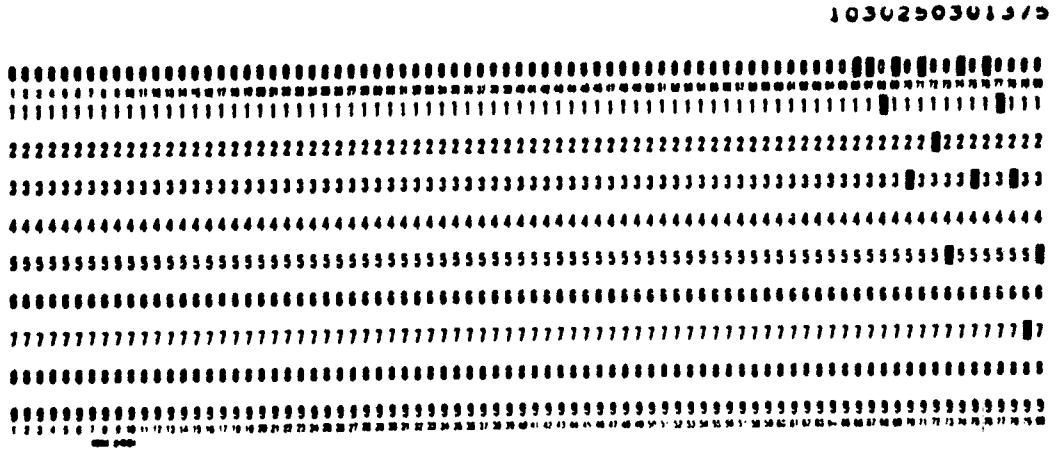


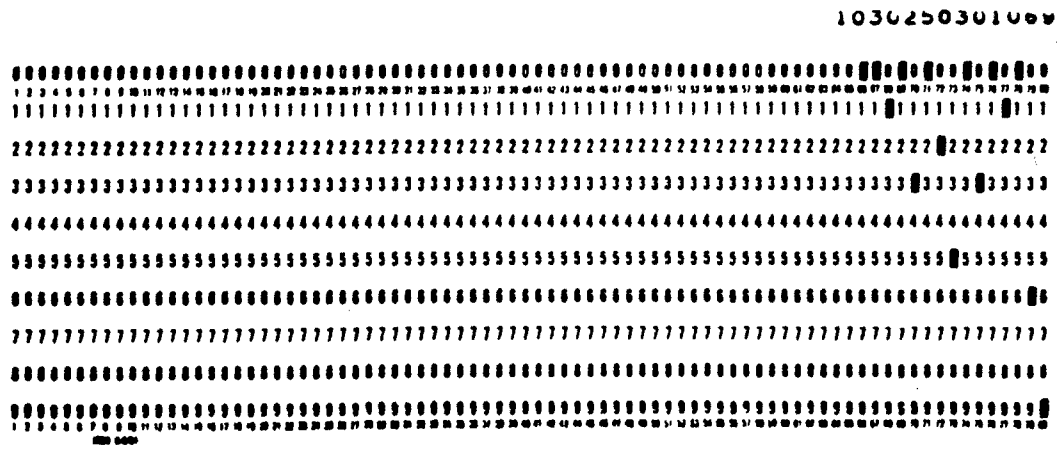




DETAIL PUNCHED CARDS







APPENDIX D

CARD FILE FORMATS--HONEYWELL 200 SYSTEM

APPLICATION: JOB NO. 217 EPIC FILE UPDATE

DATE: ____________ Master Card File Format PAGE: ____________

MATERIAL NAME

Transaction Codes:

A - Delete complete material code
C - Change single entry (master)
D - Delete single entry
M - Change complete material code
N - New entry

MATERIAL NAME (1–64)	CATEGORY (65)	(66–67)	TRANS CODE (68)	Material Code No. (69–73)	PROD CODE NO. (74–75)	ACCESSION NO. (76–79)	MASTER CODE (80)

APPLICATION: 217 - 51 **DATE:** _____ Retrieval Request Card Format **PAGE:** ____OF____

REQUESTOR NUMBER 1	MATERIAL NUMBER 2	PROPERTY # 3	# TO BE = 4

1. Requestor ID is a 6 digit numeric field
2. Material Number is 5 numeric digits giving the material T/B searched
3. Property Number is 2 digits giving the property T/B searched
4. Number of Properties -- This field will be 02 to select all accessions for a particular material/property otherwise it will contain the total number of properties from which equal accession will be selected.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Unclassified

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Mechanization Study of the Electronic Properties Information Center, Hughes Aircraft Company, Culver City, California

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

Final Report of on-site survey

5. AUTHOR(S) (Last name, first name, initial)

G. A. Kershaw, D. Crowder, J. E. Davis, E. G. Loges, E. Merendini, S. M. Thomas

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c.	AD 640 128
d.	

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11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
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13. ABSTRACT

The Electronic Properties Information Center (EPIC) at Hughes Aircraft Company utilizes mechanized processes for storage and retrieval of information. Outputs of the mechanized system, which is designed for the Honeywell 200 computer, are a printed file of materials with related properties, an accessions list, and a search printout of retrieved bibliographic citations with abstracts. A new system being developed for EPIC's mechanized activities is being designed for the General Electric 635 computer; this is part of a generalized information retrieval system being developed for several related activities at Hughes. EPIC is very satisfied with the results of its mechanization programs.

DD FORM 1473

Unclassified

Security Classification

Security Classification

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Digital Computers **Data** **Information Retrieval** **Subject Analysis**						

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